RESEARCH & TECHNOLOGY
TRANSPORTER

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U. S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

SAFETY

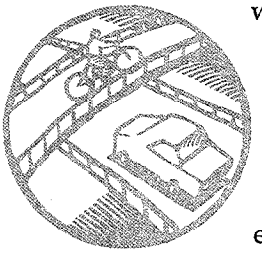
FHWA Uses HSIS Data to Examine Red Light Running Crashes

FHWA researchers have found that there is a relationship between the occurrence of crashes associated with red-light running (RLR) and the geometric features of urban, four-legged, signalized intersections.

Instances of red-light running may be reduced if cameras are installed at intersections that have high-volume traffic entering on the mainline and the cross streets. This camera in Howard County, MD, is set up to take still photographs of vehicles that run red lights.

According to U.S. Department of Transportation statistics, drivers who run red lights are involved in 89,000 crashes a year, inflicting more than 80,000 injuries and nearly 1,000 deaths. One may assume that the majority of these crashes result from intentional or inadvertent driver error.

However, very little is known about how the geometric characteristics of these intersections relate to the risk of crashes associated with red-light running.



Knowing which intersections are susceptible to crashes would allow engineers to modify intersections. They could also recommend to counties and cities which intersections to target for law enforcement, including the installation of red-light running cameras.

FHWA researchers used the Highway Safety Information System (HSIS), a safety database that contains crash, roadway inventory, and traffic volume data for a select group of States, to examine this relationship. Four years of crash data and one year of geometric data was used from data files taken from California. The Negative-Binomial regression

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RESEARCH & TECHNOLOGY
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The *Research and Technology Transporter* communicates FHWA research, development, and technology accomplishments, findings, information, and technology transfer opportunities. Its audience is transportation engineers and professionals in State and local highway agencies, State DOTs, Local Technical Assistance Programs, Divisions, Resource Centers, Core Business Units, academia, and the research community. The eight-page newsletter is published monthly by FHWA's RD&T service business unit. Editorial offices are housed at the Turner-Fairbank Highway Research Center. Comments should be sent to the editor at the address below. Field offices are encouraged to submit articles for publication via the appropriate agency technology leader from the editorial board listed below. The newsletter can be viewed online at www.tfhrc.gov. Subscriptions to the *Transporter* are free. Send your request to Judy Dakin at the address below, or send email to judy.dakin@fhwa.dot.gov.

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INFRASTRUCTURE

Infrastructure R&D Reports on Controlling Corrosion in Concrete Bridges

FHWA's Office of Infrastructure R&D released a report describing materials and measures that can be used for controlling corrosion in reinforced and prestressed concrete bridge structures in new construction. *Materials and Methods for Corrosion Control of Reinforced and Prestressed Concrete Structures in New Construction* (publication number FHWA-RD-00-081) summarizes the research involved in developing and evaluating the performance of various corrosion protection systems.

The adoption of corrosion-protection measures, such as the use of good design and construction practices, adequate concrete cover depth, low-permeability concrete, corrosion inhibitors, coated reinforcing steel, clad reinforcing steel and corrosion-resistant alloy reinforcing steel in new construction, will help in delaying the occurrence of corrosion of reinforcing steel in reinforced concrete bridges.

States and local transportation agencies who must handle costs associated with the salt-induced corrosion of concrete bridges are looking for ways to reduce the occurrence of this corrosion. Since concrete tends to crack—low permeability or high-performance concrete (made from partial substitution of portland cement concrete with silica fume or fly ash) is even more likely to crack than conventional concrete—the steel in the structures serves as the last line of defense against corrosion. And since the iron in the steel tends to revert to its most stable oxide state, using a barrier system on the reinforcing steel, such as epoxy coating or another organic coating or metallic coatings, is even more critical.

The ongoing research study on steel bars coated with new organic and metallic coatings and alternative solid metal bars should result in identification of more corrosion-resistant and more cost-effective alternative reinforcement for future use in concrete bridges.

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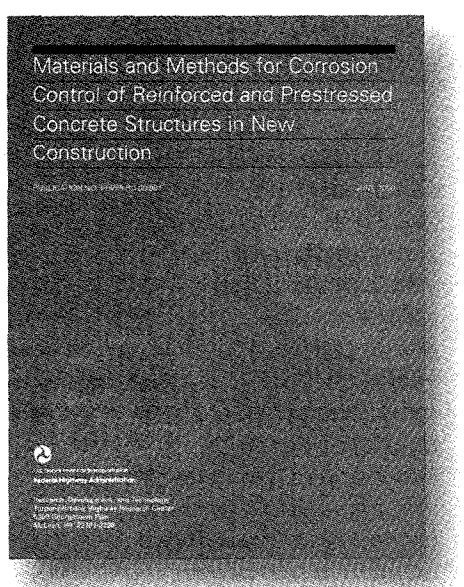
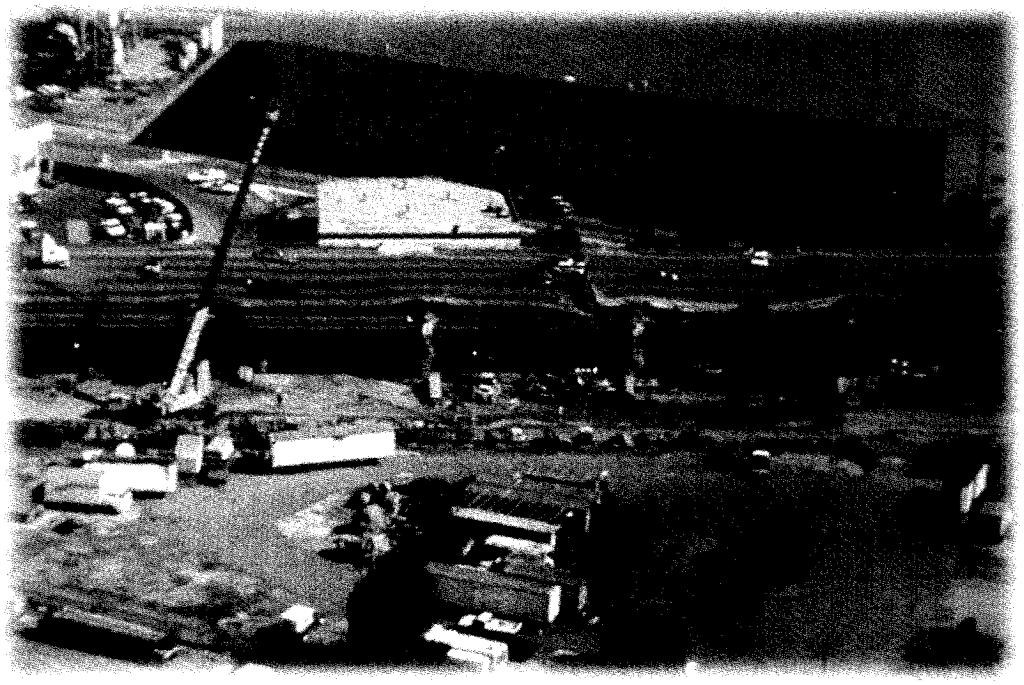


The report, *Materials and Methods for Corrosion Control of Reinforced and Prestressed Concrete Structures in New Construction*, summarizes the research involved in developing and evaluating the performance of various corrosion protection systems for concrete bridges.

FHWA Sponsors Mid-America Post-Earthquake Highway Response and Recovery Seminar

FHWA—along with ten other transportation and emergency management organizations, including the Missouri DOT and the Illinois DOT—is sponsoring the Mid-American Post-Earthquake Highway Response and Recovery Seminar in St. Louis, MO, on September 5–8, 2000.



Minimizing response and recovery time for restoring operations on our highways is essential for all communities, utilities, and businesses attempting to recover from an earthquake.

In Mid-America, much of the private and public infrastructure, including highways, was not built with seismic design considerations. The conference will help State and local highway agencies in Mid-America to understand the many issues related to emergency preparation and response to a major earthquake. The impact of disrupting public and private utilities, such as pipelines, can affect areas beyond Mid-America, and potentially could be felt throughout the United States.

Bridge inspectors, State DOT construction and maintenance personnel, public relations personnel, public works directors, city or county engineers, and emergency management personnel responsible for planning and responding to earthquake disasters should attend this seminar.

For more information, visit *www.fhwa.dot.gov/modiv/quake.htm.*

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Performance-Related Specifications CD Now Available

A new CD-ROM, *Guide to Developing Performance-Related Specifications* is now available. This CD contains a four-volume report presenting guidelines and recommendations to assist State and local highway/transportation agencies in developing and using performance-related specifications for portland cement concrete pavement construction.

Through the use of PaveSpec 2.0 software, also contained in this CD, State and local highway/transportation agencies can develop performance-related specifications and predict the performance of a constructed pavement. The PaveSpec 2.0 software can also be used as a technology-transfer tool to enable both contractors and highway agencies to gain a better understanding of what it takes to construct high-performance pavements.

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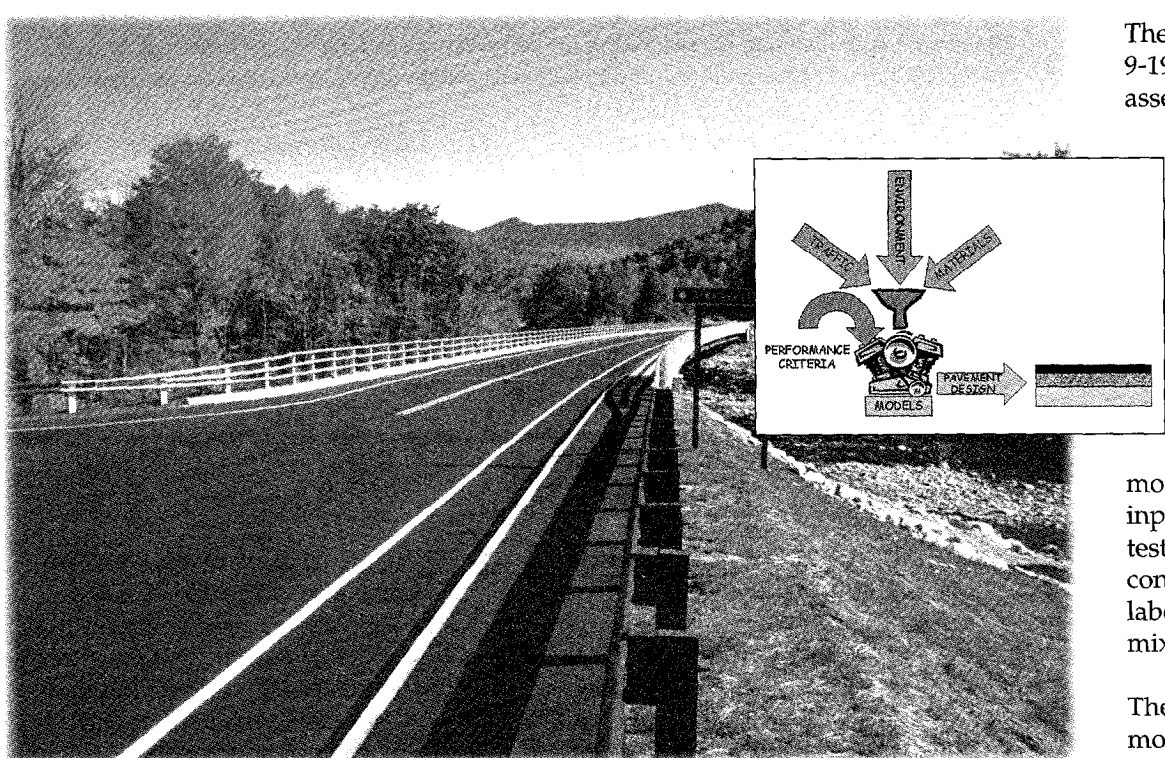
Models Lead to Better Asphalt Pavements

FHWA is using models from the ongoing National Cooperative Highway Research Program (NCHRP) projects for the development of the 2002 Pavement Design Guide, for improvement of Superpave materials characterization, and for the development of performance-related specifications (PRS). Researchers at FHWA are working with these models to improve design and construction to provide longer-lasting asphalt pavements.

Models are mathematical equations that relate something one can measure to something one wants to predict. For example, a model could predict the amount of rutting a pavement is likely to exhibit based on in-place density and projected traffic volume. Models for asphalt pavements must be accurate, so they take into account everything that has an impact on performance, including traffic, environment, and the materials properties of the asphalt and the underlying layers.

Researchers are using models to develop thickness requirements for the upcoming 2002 pavement design guide. The NCHRP researchers are basing the new design guide on existing models and test procedures. Since developing, validating, and calibrating a new model can be a very long process, a hierarchical approach to the use of the models has been chosen. Users of the model have the option to either input a little information or a lot in the design of the pavement section: the more information they put in, the more accurate the prediction. The thickness developed by the models is dependent on the performance criteria and inputs the user selects. Obviously, the amount of effort to be put into a design is related to a pavement's role in the user's transportation system.



By working with models, researchers work to create specifications that will lead to the construction of more durable asphalt pavements.

The NCHRP project 9-19 involves assessing the performance of an asphalt mix. Researchers are developing advanced material characterization tools for Superpave. These new models will rely on input from new tests, which will be conducted in the laboratory during mix design.

The last bit of modeling going on currently involves performance-related specifica-

tions. The goal of PRS is not to develop thickness requirements like the new 2002 pavement design guide, nor is it to predict the performance of a mix like the upcoming Superpave model from 9-19. The goal of PRS is to develop overall specifications for the construction of asphalt pavements. PRS differ from current construction specifications—they are performance-based and use performance prediction models to determine acceptance criteria and pay factors.

Models for asphalt pavements must be accurate, so they take into account everything that has an impact on performance, including traffic, enivronment, and the materials properties of the asphalt and the underlying layers.

FHWA took a major step in the development of PRS for asphalt by conducting an extensive research study at a test track in Nevada. WesTrack has provided FHWA with a framework PRS system. A computer-based system was developed, which takes the pavement's particulars and the performance criteria and generates a construction specification for the pavement. The development of PRS is continuing in a new NCHRP project, 9-22, which will be conducting shadow studies with actual State construction projects over the next 2 years.

Efforts made by FHWA and NCHRP researchers to develop better models, like those outlined here, are expected to produce improved structural and mixture designs and better construction specifications for asphalt pavements—and result in longer lasting pavements in the coming decades.

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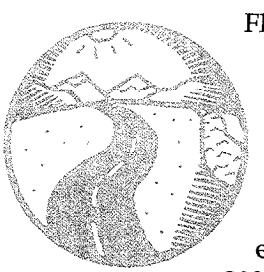
PLANNING AND ENVIRONMENT

FHWA and FTA Issue Proposed Planning and Environmental Rules

FHWA and the Federal Transit Administration (FTA) issued two proposed rules to strengthen the transportation planning process and promote environmentally sound investment choices. The rules would govern the process for distributing more than $30 billion worth of highway and transit projects annually.

One of the rules is for metropolitan and statewide planning (FHWA Docket No. FHWA-99-5933) and the other is for highway and transit project development and implementation under the National Environmental Policy Act (NEPA) (FHWA Docket No. FHWA-99-5989). The two rules are linked in terms of their working relationship between FHWA and FTA and are posted in the *Federal Register* (May 25, 2000, Vol. 65, No. 102).

The proposed rules eliminate the stand-alone Major Investment Study requirement and provide for closer links between planning and project development under NEPA. This allows for planning and project development that can be tailored to State and local conditions.



"These rules will help to streamline transportation decision making enabling States and metropolitan planning organizations to advance environmentally sound projects more expeditiously," FHWA Administrator Kenneth R. Wykle said.

FHWA and FTA invite comments on the proposed rules. The comment period for the proposed planning and environmental rules has just been extended until Sept. 23, 2000. The rules and collateral information are also available through the FHWA and FTA websites (*www.fhwa.dot.gov* and *www.fta.dot.gov*, respectively).

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FHWA Releases Transportation Conformity Reference Guide

FHWA released the Transportation Conformity Reference Guide, a 453-page guide designed to help State and local agencies comply with the transportation conformity requirements in the Clean Air Act Amendments of 1990.

FHWA and the Federal Transit Administration prepared the guide, in cooperation with the Environmental Protection Agency and other stakeholders.

The guide will be updated periodically on FHWA's website to include new information, guidance, court rulings, case studies, research findings.

The guide is also available on CD-ROM and may be obtained from FHWA Division Offices and Resource Centers, FTA Regional Offices, State DOTs, and metropolitan planning organizations.

The guide can be viewed or downloaded from the FHWA website at *www.fhwa.dot.gov/environment/conform.htm.*

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TECHNOLOGY MARKETING

Midwest Resource Center Hosts T-2 Gathering

With the restructuring of FHWA, the system for managing technology transfer, or "T-Squared," efforts has changed. Where once there was a central office charged with coordinating all T-2 work, now technology transfer is a task that each office has to coordinate independently. This year, resource centers were provided with funds with which to finance technology transfer efforts in their locales. However, no requirements or suggestions on exactly how to distribute the funds was offered. Should the funds be passed along to divisions? And if so, in what manner? Each resource center was left to come up with its own approach to the challenge.

The Midwest Resource Center came up with its own approach, and in June, Midwest Resource Center (MRC) Technology Transfer Specialist Nelda Bravo organized a meeting in the Olympia Fields office to review the current year's efforts. Coordinators from MRC-area divisions would be asked to review how well their new program worked and share ideas on new technology. Bravo also invited T-2 representatives from other resource centers, divisions, and Western Federal Lands, to hear how T-2 programs in those areas were working.

"We wanted to get a handle on our program, and it seemed that the best way to do that was to get everybody in a room and discuss where we are and where we need to go," said Bravo.

The result was an informative, enthusiastic interchange of ideas. Attendees found that, while the specific funding processes of the different resource centers varied, they all shared some common approaches: each provided some fixed amount to their respective divisions, each dedicated an additional amount to the resource center itself, and each held some sort of competition for remaining funds. Based on the great success of the gathering, other resource centers are discussing holding similar meetings in their areas.

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PROFESSIONAL DEVELOPMENT

Awards Announced for Eisenhower Fellowships

Universities and Grants Programs have awarded Dwight David Eisenhower Transportation Fellowships (DDETF) to 65 students for the 2000 academic year.

A review panel at the National Highway Institute recently evaluated 72 applications for the Graduate Fellowship award category. Of the eight applicants awarded, four are enrolled in master's degree programs and four in doctoral degree programs.

Universities in which Graduate Fellowship recipients are enrolled include: Cornell University; Iowa State University; Massachusetts Institute of Technology (MIT); North Carolina State University; University of California, Berkeley; University of Maryland, College Park; and University of Washington. In addition to the year 2000 recipients, 17 Graduate Fellowship recipients from 1998 and 1999 have been awarded the balance of their funding. Of the $2 million allocated annually for the DDETF program, $1,019,636 has been awarded to Graduate Fellowship recipients.

Among campus-based fellowship awards, 40 students shall receive one-year fellowships at participating Historically Black Colleges and Universities (HBCUs) or Hispanic Serving Institutions (HSIs). Applicants for these awards are rated and ranked by review panels convened by the Eisenhower fellowship representative on their respective campuses. This year 29 students from 16 HBCUs and 11 students from 6 HSIs will receive tuition and stipend support.

Among institutions represented by the recipients, eight are University Transportation Centers. These include MIT; Morgan State University; Iowa State University; North Carolina A&T State University; North Carolina State University; South Carolina State University; University of California, Berkeley; and the University of Washington.

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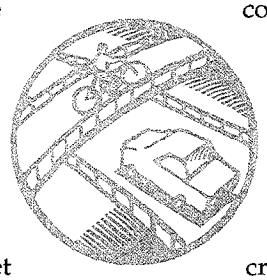
(Continued from front page)
models indicated a seven-percent increase in RLR crashes involving at-fault vehicles entering from the cross street for each one-lane increase on the mainline, if signal operation, the average daily traffic (ADT) of the opposite street, and left-turn channelization are held constant.

RLR crashes involving at-fault vehicles entering from the mainline increase when there is both higher ADT on the mainline and higher ADT per lane on the crossing street. This could mean that RLR crashes are affected by both the number of vehicles entering an intersection (vehicles that could possibly run through the red light as indicated by mainline ADT), and the number of available gaps in the crossing flow (as measured by the crossing-street ADT).

RLR crashes involving at-fault vehicles entering from the lower-volume cross street increased when ADT was higher on the mainline (i.e., increased traffic, meaning fewer gaps), but not when there was higher ADT entering on the cross-street itself.



The results suggest that crashes caused by RLR could be reduced by installing RLR cameras and enforcing red-light running at intersections with high-volume traffic entering on the mainline and cross street, at mainline streets, and at intersections with fully actuated signals.

For more information concerning this report, please contact the HSIS Laboratory at (202) 493-3464 or visit TFHRC's website *(www.tfhrc.gov)*. Also visit the FHWA's web site on red-light running crashes for more details on the overall problem and possible solutions *(http://safety.fhwa.dot.gov/stoprlr)*.

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